

## ABSTRACT

Two TE modes whose electric-field rotating planes have a perpendicular relationship are coupled independently of the coupling between two TM modes whose electric-field directions have the same respective perpendicular relationships. In a multimode dielectric resonator device producing four modes:  $TM_{01\delta\_x}$  mode,  $TM_{01\delta\_y}$  mode,  $TE_{01\delta\_x}$  mode, and  $TE_{01\delta\_y}$  mode, protrusions (Pe1), (Pe2) are disposed on an upper-layer (La) and a lower-layer of a dielectric core (1) to cause a difference in effective dielectric constants of individual parts through which even-mode and odd-mode electric flux of the TE coupling modes passes. A protrusion (Pc) is formed on a middle-layer Lb of the dielectric core (1) such that the effective dielectric constants of the parts through which even-mode and odd-mode electric flux of the TM coupling modes pass become substantially equal. Thereby, the  $TE_{01\delta\_x}$  mode and  $TE_{01\delta\_y}$  mode are coupled while restraining the coupling of the  $TM_{01\delta\_x}$  mode and the  $TM_{01\delta\_y}$  mode.

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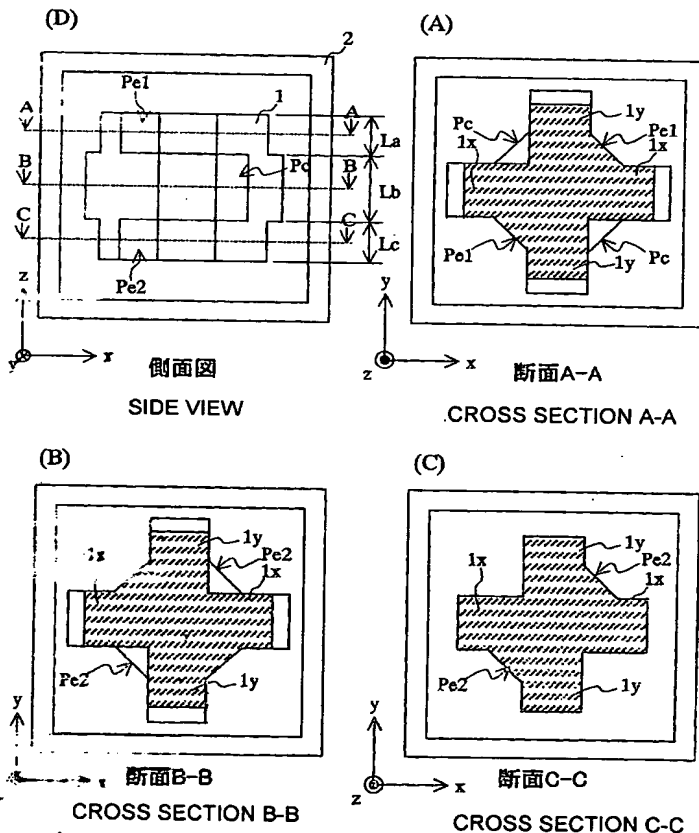
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(54) 発明の名称: 多重モード誘電体共振器装置、誘電体フィルタ、複合誘電体フィルタおよび通信装置



(57) Abstract: Two TE modes the electric fields of which rotates on mutually perpendicular planes are coupled independently of the coupling of two TM modes the electric fields of which are oriented in the directions in the same perpendicularity relation of the TE modes. A multimode dielectric resonator device have four modes: TM01  $\delta$ -x mode, TM01  $\delta$ -y mode, TE01  $\delta$ -x mode, and TE01  $\delta$ -y mode. Protrusion portions (Pe1, Pe2) are provided to upper and lower layer portions (La, Lc) of a dielectric core (1). Therefore, the effective dielectric constant of the portion where the dielectric flux of the even mode of the TE coupling modes passes is made different from that of the portion where the dielectric flux of the odd mode of the TE coupling modes passes. A protrusion portion (Pc) is provided to an intermediate layer portion (Lb) of the dielectric core (1). Therefore, the effective dielectric constant of the portion where the dielectric flux of the even mode the TM coupling modes passes is almost equal to that of the portion where the dielectric flux of the odd mode of the TM coupling modes passes. Thus, while suppressing the coupling between the TM01  $\delta$ -x mode and the TM01  $\delta$ -y mode, the coupling of the TE01  $\delta$ -x mode and TE01  $\delta$ -y mode is established.